REMARKS

Status of the prosecution

An appeal brief was filed on April 9, 2003. The Examiner has reopened prosecution in view of the appeal brief and has issued a new, non-final rejection.

In response, Applicant is filing the present reply under 37 CFR 1.111. Reinstatement of the appeal is not requested at this time.

The Examiner has rejected all of the currently pending claims as obvious over Kuo in view of offical notice of the condition of the prior art (claims 1 and 9), or in view of the above and further in view of Kimura (claims 2, 5-7, and 9-18, and on separate grounds, claims 3-4 and 8).

Traversal and request for reconsideration

Applicants respectfully traverse these rejections and beg for reconsideration in view of the arguments that follow.

The invention as recited in claim 1

Claim 1 is directed to a noise-cancelling telephone handset. Significantly, the noise-cancelling system is a fixed, feed-forward system using a non-adaptive IIR filter to process a noise reference signal and forward it to a loudspeaker or other output device (i.e., the "receiver transducing element in the handset").

The invention of claim 1 addresses the problem of how to provide noise reduction in a handset at low cost, while still accommodating user-to-user variations in acoustic path. That is, a feed-forward noise-cancelling system must incorporate a model of the acoustic path (for environmental noise) from the location where the noise reference microphone samples the acoustic field, to the location where the user's ear samples the acoustic field. That path will be different for different users. According to conventional practice, the noise-cancelling system adapts itself to such variations by employing an adaptive filter. (The cited Kuo reference exemplifies the use of adaptive filters for noise cancellation, although—as discussed below—Kuo is directed to different problems, such as how to make machinery quieter.)

Unfortunately, adaptive filters require computational capacity and thus typically add expense. Therefore, absent an alternative, it may be economically unattractive to include noise cancellation in handsets, particularly low-cost wireless handsets.

The present invention solves the problem by providing an alternative to the use of adaptive filters. That is, the present Applicants have made the remarkable discovery that individual users instinctively tend to position the handset, in use, so as to optimize the performance of the noise-cancellation system. As a consequence, a fixed, non-adaptive noise-cancellation system becomes practical and feasible.

The rejection of claim 1

The Examiner has cited Kuo as disclosing all elements of the present invention, except for a non-adaptive IIR filter. The Examiner has taken official notice that non-adaptive IIR filters are known in the art, and argues that the artisan of ordinary skill would be motivated to replace the adaptive filter of Kuo with such a non-adaptive filter in order to require "fewer calculations and thus [achieve] a high sample rate filter."

Applicants' objection to the Examiner's characterization of the prior art

Initially, Applicants wish to point out that the Examiner is incorrect in his assertion that the ANR system of Kuo "is configured as a fixed feed-forward noise-cancellation system". The term "fixed" in the context of the present claim 1 means "non-adaptive." See, for example, Specification, page 3, lines 9-11: "That is, the user of a fixed (i.e., non-adaptive) feed-forward noice canceling handset tends to . . . position the earpiece . . . so that noise cancellation performance is maximized."

By contrast, Kuo thoroughly accepts the necessity of adaptation in "main filter" 66 of ANC 50, and in repeated references to filter 66 describes it exclusively as an adaptive filter. For example, see references to "adaptive active

noise control system filter 66" at column 7, lines 49-55, column 8, lines 7-10, column 9, lines 30-35 and 37-61, and column 11, lines 44-49 and 55-58.

In fact, Kuo assumes that filter 66 must be "adaptive" even in the final paragraph of the Specification, where various "changes, substitutions, and alterations" are listed by way of attempting to define a broad scope for the invention: "For example, the feedback neutralized primary signal may be provided to **adaptive** active noise control system filter 66 with or without having the modified modeling signal v'(n) subtracted." Column 13, lines 45-49. [Emphasis added]

Accordingly, it is respectfully submitted that the Examiner is in error, and that in fact, Kuo fails to disclose either a fixed feed-forward noise-cancellation system or a non-adaptive IIR filter.

Applicants' arguments for patentability of claim 1

Point 1—Eliminating the adaptive function is non-obvious. As noted, the Examiner has asserted that there is motivation in the prior art to replace the adaptive filter of Kuo with a non-adaptive IIR filter. Applicants respectfully submit that this assertion is misplaced. Of course it might always be argued that there is "motivation" to make a substitution in which a more complex element (here, an adaptive filter) is replaced by a less complex element (i.e., a non-adaptive filter) in order to save expense or the like. In the present case, however, the substitution suggested by the Examiner would mean eliminating a function from the noise-cancellation system. That is, adaptation would be eliminated.

The elimination of a function might in certain cases be obvious if the function were undesired. However, as explained above, Kuo utterly fails to suggest any possibility that the main filter in the Kuo noise-cancellation system might be non-adaptive. In fact, in order to make the active feedforward noise cancellation system 50 (which includes filter 66) work even better, Kuo teaches that a second active system, namely a feedback system, should be added in order to reduce the amount of anti-noise from system 50 that reaches the noise reference microphone. Significantly, the feedback system as described by Kuo

includes another adaptive filter. Thus, far from suggesting that adaptation might be eliminated, Kuo actually teaches that not one, but at least two adaptive filters should be used. Kuo, then, does not suggest that adaptation is undesired, but instead teaches that it is highly desirable.

Thus, in Applicants' view, a fair reading of Kuo can lead only to the conclusion that Kuo teaches away from any implementation of a noise-cancelling system in which a non-adaptive filter is substituted for an adaptive filter.

Point 2—Kuo is not analogous art and is therefore inapposite. The invention of claim 1 is directed to noise cancellation in a telephone handset, whereas Kuo is directed to the different problem of cancelling noise from machinery and the like. Therefore, Kuo is highly inapposite. Even if it were *arguendo* obvious to eliminate adaptation from Kuo, the result would not be the present invention. It would only be an inferior or inoperative version of the Kuo ANC system for making machines quieter.

Even when the Kuo teaching is interpreted as broadly as possible, it is impossible to find there any suggestion that the same methods applied to make, e.g., an air-conditioning unit less annoying to passers-by might be successfully applied to make received far-end speech more intelligible to a telephone customer when the far-end speech is electronically combined with a noise-cancellation signal within the handset. Much less, then, is there any suggestion that an inferior version of the Kuo system, lacking adaptation, might find useful application in handsets.

In fact, the noise nuisance addressed by Kuo doesn't even have to be audible sound. Instead, it may be, for example, mechanical vibration. In general, it is "any type of undesirable disturbance or noise signal provided by a a noise source through an environment, whether it is borne by electrical, acoustic, vibration, or any other kind of noise media." Column 1, lines 40-45. It may be detected (to provide a reference signal) "using virtually any type of sensor such as a microphone, a tachometer, and an accelerometer, to name a few." Column 6, lines 41-43. The secondary source for producing the canceling "anti-noise"

signal "may be implemented using virtually any signal source such as a speaker, a shaker, or virtually any other available signal source." Column 6, lines 60-63. More specifically, the nuisance to be abated may be noise produced by "appliances such as refrigerators and window air conditioner units". Column 3, lines 38-41.

Thus, the type of problem addressed by Kuo involves mitigating environmental noise of various types.

By contrast, the present invention addresses a problem that cannot be solved by generally mitigating environmental noise. Instead, the present invention addresses a specific problem caused by environmental noise—unintelligibility of far-end speech when a handset is used in a noisy environment. The invention relates to a specific way to cancel environmental noise in the signal path within the handset so as to increase the intelligibility of the far-end speech. Moreover, inter-user variability in the noise path must be accommodated. Kuo provides no suggestion as to how any of the technical issues related specifically to telephonic communication might be addressed. Therefore, it is respectfully submitted that even when full credence is given to the Examiner's observations concerning the prior art, Kuo fails to establish *prima facie* obviousness of the present claim 1.

Patentability of claims 1 and 9

For the reasons expressed above, Applicants respectfully submit that claim 1 is patentable over Kuo under the standard of 35 USC 103, and that claim 9 is likewise patentable as the corresponding method claim.

Patentability of claims 2-8 and 10-18

Claims 2-8 depend from claim 1. Claims 10-18 depend from claim 9. Certain secondary references have been cited in the rejection of claims 2-8 and 10-18. It is respectfully submitted, however, that Applicants' arguments concerning the patentability of claims 1 and 9 stand even when these further

references are taken into consideration. Therefore, it is further submitted that claims 2-8 and 10-18 are patentable as depending from patentable head claims.

New claim 19

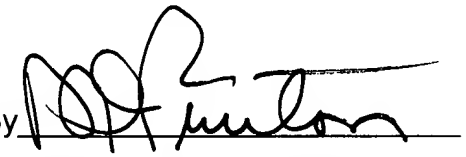
Applicants wish to add new claim 19 by the present amendment. Applicants submit that claim 19 is fully supported by the Specification and introduces no new matter, and that it is patentable over the cited art for substantially the same reasons as claim 1.

Conclusion

Having responded to all points of rejection, Applicants respectfully solicit allowance of all claims now pending in their application.

Respectfully submitted,

Dunmin Zheng
Michael Anthony Zuniga

By 

Martin I. Finston, Attorney
Reg. No. 31613
908-582-2908.

Date: July 12, 2005

Docket Administrator (Room 3J-219)
Lucent Technologies Inc.
101 Crawfords Corner Road
Holmdel, NJ 07733-3030